CLAIMS

1. A cell for the electrowinning of aluminium from alumina dissolved in a fluoride-containing molten electrolyte, comprising a plurality of metal-based anodes provided with an oxygen evolving electrochemically active structure having a series of substantially vertical through-openings for the escape of anodically produced gaseous oxygen, the electrochemically active structures facing and being spaced apart from an aluminium-wettable drained cathode surface on which aluminium is produced, the drained cathode surface being formed along the cell by upper surfaces of a series of juxtaposed carbon cathode blocks, the cathode blocks extending across the cell, the cathode blocks comprising means for connection to an external electric current supply, wherein the drained cathode surface is divided into quadrants by a longitudinal aluminium collection groove along the cell and by a central aluminium collection reservoir across the cell, pairs of quadrants across the cell being inclined in a V-shape relationship, said collection groove being located along the bottom of the V-shape and arranged to collect molten aluminium draining from the drained cathode surface and evacuate it into the aluminium collection reservoir(s) during cell operation.

2. The cell of claim 1, comprising at least one carbon-based spacer block extending across the cell which spaces and is juxtaposed between cathode blocks extending across the cell, (an) upper surface(s) of the spacer block(s) comprising a central recess which is lower than the aluminium collection groove and which extends substantially across the cell to form said central aluminium collection reservoir.

3. The cell of claim 2, wherein said central recess extends between said juxtaposed cathode blocks to form with

juxtaposed sidewalls thereof said central aluminium collection reservoir.

4. The cell of claim 2, wherein a pair of spacer blocks arranged end-to-end extends across the cell between said juxtaposed cathode blocks.

5. The cell of claim 1, wherein the drained cathode surface is formed along the cell by upper surfaces of a series of juxtaposed carbon cathode blocks extending in pairs arranged end-to-end across the cell.

6. The cell of claim 1, wherein the aluminium collection groove is located below the bottom of the inclined quadrants.

7. The cell of claim 1, wherein the electrochemically active structure of the metal-based anodes comprises a series of anode members, each having an electrochemically active surface on which during electrolysis oxygen is anodically evolved.

8. The cell of claim 7, wherein the anode members are in a parallel arrangement connected by at least one connecting cross-member.

9. The cell of claim 7, wherein the anode members are in a concentric arrangement connected by at least one generally radial connecting member.

10. The cell of claim 7, wherein the anode members are in a parallel or concentric arrangement connected by at least one connecting member, the electrochemically active surfaces of the anode members of each anode being in a generally coplanar arrangement and spaced laterally to form longitudinal flow-through openings for the up-flow of alumina-depleted electrolyte driven by the upward fast escape of anodically evolved oxygen, and for the down-flow of alumina-rich electrolyte.

11. The cell of claim 7, wherein the anode members of each anode are blades.

12. The cell of claim 7, wherein the anode members of each anode are bars, rods or wires.

13. A cell bottom of a cell for the electrowinning of aluminium from alumina dissolved in a fluoride-containing molten electrolyte, comprising an aluminium-wettable drained cathode surface on which aluminium is produced, the drained cathode surface being formed along the cell bottom by upper surfaces of a series of juxtaposed carbon cathode blocks, the cathode blocks extending across the cell bottom, the cathode blocks comprising means for connection to an external electric current supply, wherein the drained cathode surface is divided into quadrants by a longitudinal aluminium collection groove along the cell bottom and by a central aluminium collection reservoir across the cell bottom, pairs of quadrants across the cell bottom being inclined in a V-shape relationship, said collection groove being located along the bottom of the V-shape and arranged to collect molten aluminium draining from the drained cathode surface and evacuate it into the aluminium collection reservoir(s) during cell operation.

14. The cell bottom of claim 13, comprising at least one carbon-based spacer block extending across the cell bottom which spaces and is juxtaposed between cathode blocks extending across the cell, (an) upper surface(s) of the spacer block(s) comprising a central recess which is lower than the aluminium collection groove and which extends substantially across the cell to form said central aluminium collection reservoir.

15. The cell bottom of claim 14, wherein said central recess extends between said juxtaposed cathode blocks to form with juxtaposed sidewalls thereof said central aluminium collection reservoir.

16. The cell bottom of claim 14, wherein a pair of spacer blocks arranged end-to-end extends across the cell bottom to space said juxtaposed cathode blocks.

17. The cell bottom of claim 13, wherein the drained cathode surface is formed along the cell bottom by upper surfaces of a series of juxtaposed carbon cathode blocks extending in pairs arranged end-to-end across the cell bottom.

18. The cell bottom of claim 13, wherein the aluminium collection groove is located below the bottom of the inclined quadrants.

19. A method to produce aluminium in an aluminium electrowinning cell having anodes immersed in a molten electrolyte containing dissolved alumina and which face a cell bottom as defined in claim 13 comprising an aluminium-wettable drained cathode surface which is formed by upper surfaces of a series of cathode blocks and which is divided into quadrants by a longitudinal aluminium collection groove along the cell and by a central aluminium collection reservoir across the cell, pairs of quadrants across the cell being inclined in a V shape relationship, the collection groove being located along the bottom of the V-shape, the method comprising electrolysing the electrolyte containing dissolved alumina between the anodes and the drained cathode surface to produce gas on the anodes and molten aluminium on the drained cathode surface; draining the cathodically produced molten aluminium from the drained cathode surface into the collection groove; and evacuating the molten aluminium to the aluminium collection reservoir(s).

20. The method of claim 19, comprising producing oxygen on a metal-based electrochemically active anode structure and releasing the produced oxygen through substantially vertical through-openings located in the anode structure.

21. The method of claim 19, comprising intermittently tapping the produced aluminium from the aluminium collection reservoir.

22. The method of claim 19, wherein the cell is operated with a molten electrolyte at a temperature of 700° to 910°C.

23. The method of claim 22, wherein the cell is operated with a molten electrolyte at a temperature of 730° to 870°C.